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(54)

COLOURED TRANSITORY IMAGES IN PRINTED ARTICLES

(70)

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Granted to Canadian Bank Note Company, Limited,  
Canada

(21)

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(22)

(30)

PRIORITY DATE

No. OF CLAIMS 18

#### ABSTRACT

A printed article comprises generally parallel equispaced coloured lines of alternating contrasting colours upon which are superimposed generally parallel equispaced embossed lines. The embossed line spacing is twice the coloured line spacing. In part of the article, the phase relationship of coloured lines to embossed lines is shifted through a coloured line spacing to generate a recognition pattern. Because of selective occlusion of the coloured lines by the embossed lines, a transitory image exists within the recognition pattern, whose apparent colour changes as the angle of view of the surface of the article is varied. The transitory image effect is difficult to duplicate and the technique thus deters counterfeiting.

FIELD OF THE INVENTION

This invention relates to printed articles provided with co-operating embossed and coloured areas creating transitory images, for the purpose of deterring counterfeiting.

BACKGROUND OF THE INVENTION

Intaglio-printed articles provided with spaced and raised ink pattern elements on the surface thereof, the colour of the pattern elements contrasting with the colour of the surface of the article, for the production of transitory images on the article, are described in Canadian Patent Application No. 146,533, filed 6 July, 1972 (R. G. Hutton et al.), to be issued as Canadian Patent No. 965,125 dated 25 March, 1975. A "transitory image" may be defined as one that appears into view or disappears from view when the viewing angle of the observer with respect to the surface of the article varies. The desirability and utility of such transitory images as deterrents to counterfeiting are fully set forth in the aforementioned disclosure of Hutton et al. and will not be dwelt upon here.

A. E. Taylor in United States Patent No. 1,990,421 granted 5 February, 1935 has described the use of co-operating coloured line patterns and embossed line patterns to produce apparent colour changes in an article as the same is viewed by an observer from different angles of view with respect to the surface of the article. Taylor's disclosure is directed to the production of what he considered to be aesthetically pleasing gross effects in the article; he was not concerned with the problem of counterfeiting nor with the objective of effecting, on an article, one or more transitory images in the nature of recognition patterns for the purpose of ascertaining the authenticity of the article bearing such patterns. Furthermore, Taylor's disclosure gives no directives with respect to



t inter-relationship of surface pattern elements and embossed pattern elements that would be suitable for creating coloured transitory images on printed articles.

#### SUMMARY OF THE INVENTION

The present inventors have discovered that recognition patterns comprising coloured transitory images in printed articles may conveniently and reliably be created as follows: The printed article is provided with a first set of lines of substantially uniform width of one colour and a second set of lines of substantially uniform width of a second contrasting colour, alternating with the lines of the first set. A third set of spaced embossed lines is provided upon the article, superimposed upon the first and second sets of lines. Corresponding edges of the embossed lines are spaced apart by substantially the distance between the centres of any two sequential lines of either the first or the second set of coloured lines. In other words, the line frequency of embossed lines is the same as the line frequency of any one colour but is one-half the line frequency of the coloured lines of both colours since the coloured lines alternate.

The embossed lines are arranged to overlap the first and second lines in at least one visually-perceptible portion of the surface of the article at an angle in the range  $0^{\circ}$  -  $10^{\circ}$ . To define a recognition pattern, the first and second sets of lines (or of the embossed set of lines), are offset within the recognition pattern by one coloured line width from adjacent portions of the first and second sets of lines, (or of the embossed set of lines, as the case may be) outside the recognition pattern. In other words, the overlapping relationship of the embossed line pattern to the coloured line pattern is phase shifted through one coloured line width when passing from one side of the boundary of the recognition pattern to the other side. The recognition pattern thus defines an identifiable transitory image. Within the recognition pattern,

the first set (say) of coloured lines is occluded by the embossed lines in a visually perceptible portion of the recognition pattern, when the article is viewed from an acute angle to the surface. Immediately across the boundary outside the recognition pattern, there is no occlusion of the first set of lines (say). Optionally, the other set of coloured lines is occluded by the embossed lines immediately outside the recognition pattern. The apparent colour of the recognition pattern relative to the immediately adjacent (background) portions of the surface of the article changes as the angle of viewing the surface of the article changes. If the embossed lines have no colour, then at an acute angle, the occlusion of two different sets of coloured lines, one set lying immediately outside the boundary of the recognition pattern and the other set lying immediately within the boundary of the recognition pattern, creates a colour contrast between the recognition pattern and the background. If the embossed lines are coloured, as by intaglio printing, then at a sufficiently acute angle of view, the colour of the embossed lines will be dominant in the visual field presented to the observer, and the recognition pattern will disappear. If the embossed lines are of the same colour as one of the first two sets of lines, the recognition pattern may be visible when the article is viewed from a normal direction, and may apparently disappear when the angle of view is changed to a certain acute angle, because the set of lines of contrasting colour is effectively occluded by the embossed lines. (In the special case in which the embossed lines are exactly parallel to the coloured lines of the background, the last two mentioned visual phenomena correspond to phenomena described in the aforementioned Canadian Patent Application No. 146,533.)

Conveniently, the first and second sets of lines are

parallel or follow gentle generally parallel curves. Conveniently also, the width of each of the first set of lines is equal to the width of each of the second set of lines, or nearly so. The first set (say) of coloured lines may be a generally parallel array of spaced coloured lines. The second set of lines may then comprise the unprinted spaces between the first set of lines, retaining the colour of the unprinted substrate. Or the width of the lines may be less than the line spacing, in which case unprinted substrate spaces exist between adjacent coloured lines. Furthermore, the width of the embossed lines should be no greater than the width of each of the first or second set of lines, and may conveniently be substantially the same as the width of each of the first and second set of lines.

The first and second set of lines may be surface printed or intaglio printed. In one embodiment, the set of intaglio printed lines is conveniently in register with one of the sets of coloured lines. If desired, all sets of lines may be intaglio printed on the article. In another embodiment, the first and second sets of lines are simultaneously surface printed, and each of the embossed lines in at least one visually perceptible portion of the surface of the article is arranged to lie approximately between (and perhaps at least partially overlapping) one of the first set of lines and one of the second set of lines. However, this condition will not persist throughout the entire document if the pattern is large enough and if the angle of orientation of the embossed lines with respect to the first and second sets of lines is other than zero.

If desired, the embossed lines may be intaglio printed with a substantially transparent ink which facilitates maintenance of rigidity of the embossed areas, improves resistance to soiling, and tends to increase the reflectivity and colour saturation of the embossed areas. Alternatively, if the embossed lines are intaglio printed in a relatively light colour, for example white, which contrasts with the colour of at least one of the first and second sets of coloured lines, the resulting effect on the document as seen normally is to render the colours of the document less saturated or increasingly "pastel", and which may also tend to camouflage the recognition pattern when the document is viewed from the normal. If the embossed lines are intaglio printed with an ink of sufficiently high visual perceptibility, that ink will tend to dominate the entire document when the document is viewed at a very sharp acute angle to its surface, and in that case the recognition pattern (and indeed any surface patterns on the document) will be overwhelmed by the solid colour of the top surfaces of the embossed line pattern wherever it occurs.

And finally, if the colour of the embossed lines, preferably imprinted by way of intaglio printing, is the same as one but not both of the first and second sets of lines, the observer at an acute angle of view will tend to see, at least from one direction, a merging of the embossed line colour with its matching surface line colour, with the result that the recognition pattern, observable when the document is viewed in the opposite direction, will not be apparent.

Of course, if the embossed lines are oriented at other than  $0^\circ$  with respect to the first and second sets of lines, and if the recognition pattern occupies a sufficiently large area, the surface colour occluded at any given angle of view may vary as first the one set and then the other set of

surface coloured lines are sequentially occluded by the embossed lines as one scans the article. If the observer then rotates the article through  $180^\circ$  so as to view the same surface of the article upside-down, he will find that the colours occluded in any given area of the article are reversed from those occluded by his first viewing of the article.

The embossed lines may be considered to create moiré effects by interference with the coloured line pattern. If the embossed lines are at an angle to the coloured line pattern, then the moiré effects will be perceived in the background. The reader is referred to British Patent No. 1,138,011, published 27 December, 1968 (Canadian Bank Note Company Limited) for a discussion of the kinds of interference patterns which give rise to moiré effects. The artisan will presumably blend recognition pattern effects with background effects to obtain an overall aesthetically satisfactory design.

The foregoing effects have been described with reference to two sets of coloured lines. However, the principles described can be extrapolated to apply to the use of more than two colours. The significant concept throughout is the generation of a recognition pattern by effecting a phase shift of the embossed line - coloured line overlapping relationship from the area within the recognition pattern to the area just outside it.

By "lines" herein is meant visually continuous linear effects, whether such "lines" are geometrically continuous or interrupted as by spaces or an overlying pattern of lines at an appreciable angle, say  $90^\circ$ , to the "lines" under discussion.

Note that where the substrate is relatively thin, as in the case of paper banknotes, for example, the intaglio printing of one side of the banknote generates embossing of the other side of the note. If one side of the note bears a parallel coloured line pattern of the above-described type, the



complementing embossed line pattern could be generated by  
aglio printing the other side.

#### SUMMARY OF THE DRAWINGS

Figure 1 is a schematic magnified view of a portion of a printed article which bears a parallel line pattern of alternating contrasting colours.

Figure 2 is a schematic magnified view of a portion of a printed article bearing embossed line segments some of which are offset with respect to the others to define a  
10 recognizable pattern.

Figure 3 is a schematic magnified view of a portion of a printed article in which the combined effect of the patterns of Figures 1 and 2 is illustrated.

Figure 4 is a schematic magnified section view taken along the line 4-4 of Figure 3.

Figure 5 is a schematic magnified perspective view of a portion of an article imprinted in an alternative manner to obtain substantially the same visual effect as is illustrated in Figure 3.

20 Figure 6, which is located on the first page of the drawings, is a schematic magnified view of a portion of a printed article bearing lines of alternating contrasting colours portions of which are offset from the background so as to form a recognition pattern.

Figure 7, which is located on the first page of the drawings, is a schematic magnified view of a portion of a printed article bearing regularly spaced parallel embossed lines.

Figure 8, which is located on the first page of the drawings, is a schematic magnified view of a portion of a printed  
30 article illustrating the combined effect of the patterns of Figures 6 and 7.

Figure 9 is a schematic magnified view of a portion of a printed article illustrating the effect of embossing the article with lines oriented at a slight angle to a parallel line

pattern of alternating contrasting colours, portions of which are offset from the background to form a recognition pattern.

Figure 10 is a schematic magnified view of a portion of a printed article bearing alternating line segments of contrasting colours in which the background comprises gently curved generally parallel line elements and the recognition pattern is superimposed thereon utilizing alternating colour elements which contrast with the immediately adjacent background colour elements.

#### 10 DETAILED DESCRIPTION WITH REFERENCE TO THE DRAWINGS

The transitory image effects of the present invention are obtained by a combination of coloured pattern elements and embossed pattern elements. As a practical matter, it will be found that the coloured pattern elements should be substantially parallel lines (including gently curved lines of generally parallel orientation) of two different alternating contrasting colours. The embossed line pattern is also conveniently a parallel line pattern which creates interference effects with the pattern of coloured lines. In at least one area of the printed article bearing such line patterns and sufficiently large to be visually perceptible, either the embossed line pattern or one of the coloured line patterns or both are offset or phase shifted by substantially the spacing of the coloured lines with respect to the remaining (background) embossed line pattern or coloured line pattern so as to define a visually perceptible recognition pattern. In other words, as the recognition pattern boundary is crossed, there is a phase shift of the overlapping relationship between embossed and coloured lines, whereby the colour occluded by the embossed lines at an acute angle of view will be different outside the recognition pattern from the colour occluded within the recognition pattern.

In the simplest case, the alternating coloured lines may be straight parallel lines. In Figure 1, a greatly magnified portion of a printed article is shown in which blue lines (say) C1, C3, C5, etc. alternate with red lines (say) C2, C4, C6, etc. The blue lines are conveniently of the same width  $w$  as the red lines, and are uniform at least throughout the latent image area. The blue lines are shown as contiguous with the red lines, but could be separated therefrom by unprinted substrate spaces. Or one set of lines could be comprised of  
 10 unprinted substrate areas. The alternating line pattern can be printed by means of intaglio, lithography or any other suitable printing process. A possible range of line spacings is 50 to 500 lines per inch, with 100 lines per inch being representative.

In Figure 2 is illustrated in greatly magnified schematic view a pattern of embossed parallel lines E2, E4, E6, etc. alternating with which are unembossed surface portions U1, U3, U5, etc. The embossed lines E2, E4, E6, etc. may be considered to be the peaks, and surface portions U1, U3, U5, etc. the troughs of a continuous wave pattern on the surface of the printed article. The embossed lines are of uniform width and uniform spacing, and preferably the width  $w$  of the embossed lines is equal to or less than the line spacing  $w$  of each of the red and blue lines of Figure 1. The combined width of an embossed line and the adjacent unembossed surface area, or in other words, the combined width of a trough and peak, should be precisely  $2w$ , where  $w$  is the average coloured line spacing, and where the blue and red lines touch one another,  $w$  is the width of each blue line or each red line of Figure 1  
 20 (the red and blue lines being of the same width).  
 30

Figure 2 differs from Figure 1 in that an identifiable recognition pattern appears, illustrated as the letter V by way of example, whereas in Figure 1 there is no identifiable

recognition pattern superimposed upon the background. The recognition pattern of Figure 2 is formed by interrupting the embossed lines with unembossed areas, and by interrupting unembossed areas with embossed areas. Putting it another way, the background trough areas are interrupted by peak areas, and the background peak areas are interrupted by trough areas, which are arranged from line to line in a predetermined pattern whose overall visual appearance is that of the letter V. The letter V is thus formed by phase shifting the embossed line pattern in the V-shaped area by a distance equal to  $w$  with respect to the background embossed line pattern. Embossed line E2 is shown interrupted by two spaced unembossed areas U21, U22. Unembossed surface line U3 is interrupted by embossed areas E31, E32. It can be seen that embossed areas E31 and E32 are spaced slightly closer together than are areas U21 and U22. The same principles of interruption continue through lines E4 through E10 and U5 through U11 inclusive, the interrupting areas converging closer together until lines <sup>E8</sup>~~E10~~ and U11 are interrupted by only a single area U101, E111 respectively at the <sup>lower extremity</sup>~~apex~~ of the "V".

Figure 3 illustrates the combined effect of the patterns of Figures 1 and 2 on a printed substrate. The printed substrate bearing the alternating parallel coloured line pattern of Figure 1 is then embossed with the embossing line pattern of Figure 2. The embossing is effected so that the embossing lines E2, E4, etc. lie between, or overlap one half of, a blue line and an adjacent red line. Similarly, the unembossed areas U3, U5 overlap one half of a red line and one half of an adjacent blue line. The resulting three-dimensional configuration creates certain interesting visual effects, as can be better appreciated with reference to Figures 4 and 5.

Referring to Figure 4, which is a schematic section view taken along the line 4-4 in Figure 3, it can be seen that the embossed lines E2, E4, E6, etc. overlap approximately one half of adjacent lines of contrasting colour. For example, embossed line E2 occupies one half of blue line C1 and one half of red line C2. Embossed line E4 overlaps one half of blue line C3 and one half of red line C4, etc.

Accordingly, if an observer views from the right that portion of the document whose cross-section is illustrated in Figure 4, along viewing direction VR, the light from blue lines C1, C3, C5 will be reflected into the eye of the observer but light from much of the surface area of red lines C2, C4, C6, etc. will tend to be shadowed by embossed lines E2, E4, E6, etc. and will not readily reach the eye of the observer. Thus, the apparent colour of that section of the document of which Figure 4 is a section view will appear to the observer as being generally blue, or at least more blue than red.

On the other hand, if the observer views the document from the left as seen in Figure 4 along a line of view VL, it is the red coloured lines C2, C4, C6, etc. which tend to reflect light into the eye of the observer, whereas much of the area of the blue lines C1, C3, etc. lies in the shadows of the embossed lines E2, E4, etc., and the observer will therefore tend to see that section of the document of which Figure 4 is a section view as being generally red, or at least more red than blue. In other words, there has been an apparent change in colour from blue to red as one views that portion of the document of which Figure 4 is a section view, first from the right and then from the left. The apparent change may be enhanced if between blue and red lines there are left buffer spaces of unprinted substrate.

Furthermore, if the viewer views the document from the normal angle of view VN, he will see both the red and blue lines equally well, and thus the red and blue will tend to merge or be integrated visually to form an overall apparent purple colour for the entire surface of the printed article.

Note that the line 4-4 in Figure 3 was taken through that portion of the embossed line pattern forming the background pattern. If any portion of the line 4-4 had been taken through the recognition pattern (i.e. the V-shaped pattern 20), the apparent colour of the V would be exactly the opposite of the apparent colour of the background, since the peaks and troughs are exactly out of phase by width  $w$  with the peaks and troughs of the background embossed line pattern. Thus, a viewer viewing the document in the direction VR would tend to see the V-shaped pattern as red and the background as blue, whereas a viewer viewing the document from the direction VL would tend to see an upside-down V in blue against a background colour red. If the article were perfectly flat, the solid angle encompassed by the V-shaped pattern were relatively small, and the embossed lines and coloured line patterns were registered exactly as described with reference to Figure 3, then the observer viewing the printed article from the normal direction VN might fail to see the V-shaped pattern at all, and would instead tend to see only the overall purplish tone of the blended red and blue colours striking the eye. Since the aforesaid combination of conditions seldom exists in the real world, the viewer viewing the printed article from the normal direction VN would tend to see at least a faint outline of the V-shaped recognition pattern 20, and may in some instances perceive the V-shaped pattern almost as well from the normal as from an acute angle of view. However, the observer will note colour reversals in the apparent colour of the V as

the viewer changes his angle of view from VR through VN to VL.

Figure 8 is a schematic plan view and Figure 5 is a schematic perspective view of a portion of a printed article yielding the same effect as that illustrated schematically in Figure 3, but making use of offset coloured areas (See Figure 6) with an overlay of embossed parallel lines, (Figure 7). An observer viewing the printed article of Figures 5 and 8 from a viewing direction VR (See Figure 5) will tend to see the V-shaped recognition pattern as red against a blue background, because substantial areas of the blue portions of the V are shadowed by the embossed lines whereas substantial areas of the red portions of the background are shadowed by the embossed lines, thus making the V-shaped recognition pattern appear to the viewer as red against a blue background. It will also be apparent that if the viewing direction were reversed to VL, the viewer would see an upsidedown V in blue against a red background.

Thus there are two different ways in which to generate such V-shaped recognition pattern - in Figure 3, the pattern was effected in the embossed line configuration, whilst the blue and red alternating line pattern was regular and uninterrupted throughout. The same effect was obtained in Figures 5 and 8 by reversing the roles of the coloured line pattern and the embossed line pattern respectively, an equivalent V-shaped recognition pattern 60 being shown in Figure 6 as composed of interruptions in the blue and red alternating line pattern, blue coloured portions interrupting red lines and red coloured portions interrupting blue lines, the interruptions together constituting an overall configuration in the shape of a V. In other words, the coloured line pattern within the V of Figure 6 is phase-shifted by the coloured line spacing w with respect to the background coloured line pattern. The embossed line pattern used with the Figure 6 pattern is the

simple arrangement of parallel lines seen in Figure 7. When the coloured line pattern of Figure 6 is combined with the embossed line pattern of Figure 7 in accordance with the directions previously given viz. that the embossed line should overlap half of a red background line and half of a blue background line, we find that the resulting combined line pattern is as shown in Figures 5 and 8. Figure 8 is a visual equivalent of Figure 3, the only difference being that the recognition pattern has been formed by interrupting the coloured line pattern instead of by interrupting the embossed line pattern, as had been the case with Figure 3.

If a surface line printing is followed by an embossing line operation, it will be extremely difficult for the embossed lines to be aligned exactly in the same orientation as that of the parallel line alternating colour pattern. A difference in orientation of up to approximately  $10^\circ$  is tolerable, but the preferred difference is less than  $5^\circ$ . In Figure 9, the embossing line pattern is shown as oriented at a slight angle to the alternating blue and red parallel line pattern. A V-shaped recognition element 90 is effected by interrupting the pattern of embossed lines with alternating embossed and unembossed areas (i.e. alternating peaks and troughs) which are exactly out of phase with the background parallel line embossed pattern. It can be seen that in the upper left corner of the V, an observer viewing the document at an angle from the bottom (generally along viewing line VB at an acute angle to the surface of Figure 9) will perceive blue as the predominant colour of the V-shaped recognition pattern since the near side of the peaks is coloured blue (and red as the background colour, for the same reason). On the other hand, this same observer looking at the upper portion of



the right arm of the V will tend to see the colour red in the recognition pattern, since the near side of the peak is coloured red, and it is the colour blue which tends for the most part to be in the shadow of the embossed line pattern. The colour reversal effects of course continue to exist when one views the printed article upside-down (i.e. rotates Figure 9 through 180°). In some cases, the red and blue colours may tend to merge together, especially when the recognition pattern occupies a relatively large surface area. However, the observer will still tend to notice a considerable contrast between the recognition pattern and the immediately adjacent background areas when the printed article is viewed at an appropriate acute angle. As one's eye crosses the boundary of the recognition pattern, the colour occluded changes, as the article is viewed at an acute angle, because of the phase shift of the embossment-coloured line relationship within the boundary relative to the embossment-coloured line relationship immediately outside the boundary.

The straight parallel line systems described thus far are not absolutely necessary, although obviously convenient to use. Figure <sup>10</sup>~~12~~ illustrates a gently curved coloured line background in which the alternating red and blue curved lines run generally parallel to one another. A V-shaped recognition pattern 120 is shown composed of interruptions in these line patterns, blue interruptions being shown adjacent red line segments and red interruptions being shown adjacent and in the path of blue line sections. The overlying embossed line pattern to be superimposed upon the coloured line pattern of Figure 12 can be a straight parallel line pattern or a gently curved substantially parallel line pattern in accordance with the designer's preference.

Obviously the designer will wish to generate a certain

amount of aesthetic appeal in the printed article by means of appropriate combinations of embossed line configurations and coloured line configurations. Provided that the general principles outlined above are followed, considerable variation in the detail work can be exercised.

With training, persons will be alert to the presence of coloured transitory images such as those described above, in documents of value. The failure to perceive the transitory effects is a prima facie indication that a given document is

10 counterfeit.

Variations on the foregoing exemplary embodiments will readily occur to those skilled in the art. The scope of the invention is not to be construed as limited by the specific examples described herein, but is to be ascertained by reference to the accompanying claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE  
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A printed article comprising:

at least two sets of substantially coloured equally-spaced lines of contrasting colours alternating with one another;

a set of embossed lines spaced apart by substantially the spacing of lines of either one of said sets, and overlapping the two sets of lines in at least one visually-perceptible portion of the article at an angle of 0° to 10°;

the set of embossed lines selectively occluding a selected one of said two sets of coloured lines in said visually-perceptible portion at an acute angle of view of the surface of the article within an area defining a recognition pattern, the boundaries of which recognition pattern are defined by a phase shift of the pattern of embossed lines relative to the pattern of coloured lines;

whereby the apparent colour of the recognition pattern relative to the immediately adjacent pattern of said sets of coloured lines varies as the angle of view of the surface of the article changes from the normal to an acute angle of view.

2. An article as defined in Claim 1, wherein one of the sets of coloured lines is imprinted upon the substrate of the article leaving unprinted spaces between adjacent ones of said one set of lines, and wherein another of the sets of coloured lines is constituted by said spaces.

3. An article as defined in claim 1, wherein the two sets of coloured lines are substantially parallel to one another.

4. An article as defined in claim 3, wherein the embossed lines are substantially parallel to one another.

5. An article as defined in claim 4, wherein the embossed lines are substantially parallel to the two sets of coloured lines.
6. An article as defined in claim 4, wherein the angle of overlap is in the range  $0^{\circ}$  to  $5^{\circ}$ .
7. An article as defined in claim 6, wherein the phase shift is produced by offsetting the embossed lines within the recognition pattern by substantially one-half the spacing of the embossed lines relative to the embossed lines outside the recognition pattern.
8. An article as defined in claim 6, wherein the phase shift is produced by offsetting the alternating coloured line pattern within the recognition pattern by substantially one line spacing of the coloured lines relative to the coloured line pattern outside the recognition pattern.
9. An article as defined in claim 6, wherein the embossed lines are intaglio printed.
10. An article as defined in claim 9, wherein the embossed lines are printed in transparent ink.
11. An article as defined in claim 9, wherein the embossed lines are printed in white ink.
12. An article as defined in claim 9, wherein the embossed lines are printed in coloured ink.
13. An article as defined in claim 12, wherein the embossed lines are printed in substantially the same colour as one of the colours of the coloured lines.
14. An article as defined in claim 13, wherein the embossed lines are substantially in register with the coloured lines of

said same colour within the recognition pattern.

15. An article as defined in claim 13, wherein the embossed lines are substantially in register with the coloured lines of said same colour outside the recognition pattern.

16. An article as defined in claim 12, wherein the colour of the embossed lines contrasts with the colours of the two sets of coloured lines.

17. An article as defined in claim 9, wherein the line spacings of the coloured lines are in the range 50 to 500 lines per inch.

18. An article as defined in claim 9, wherein the line spacings of the coloured lines are of the order of one hundred lines per inch.



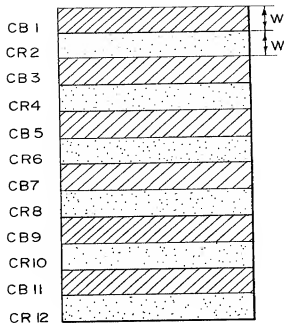


FIG. 1

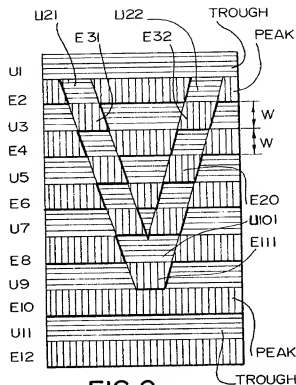


FIG. 2

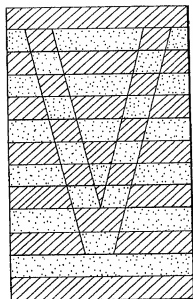


FIG. 6

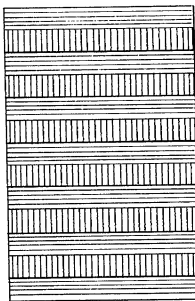


FIG. 7

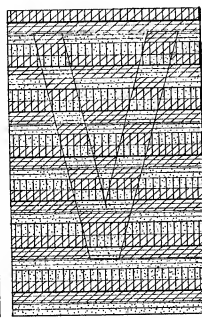


FIG. 8

LEGEND:



BLUE



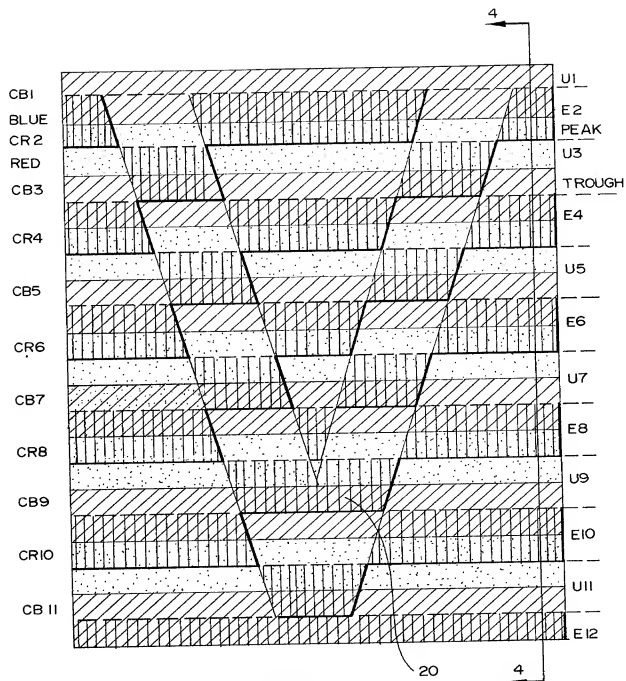
RED



PEAK



TROUGH



LEGEND



BLUE



RED



PEAK



TROUGH

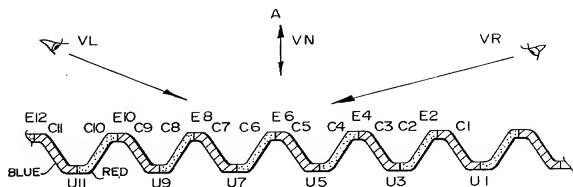


FIG. 4

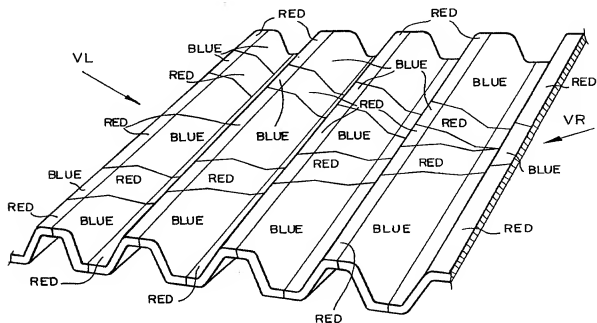
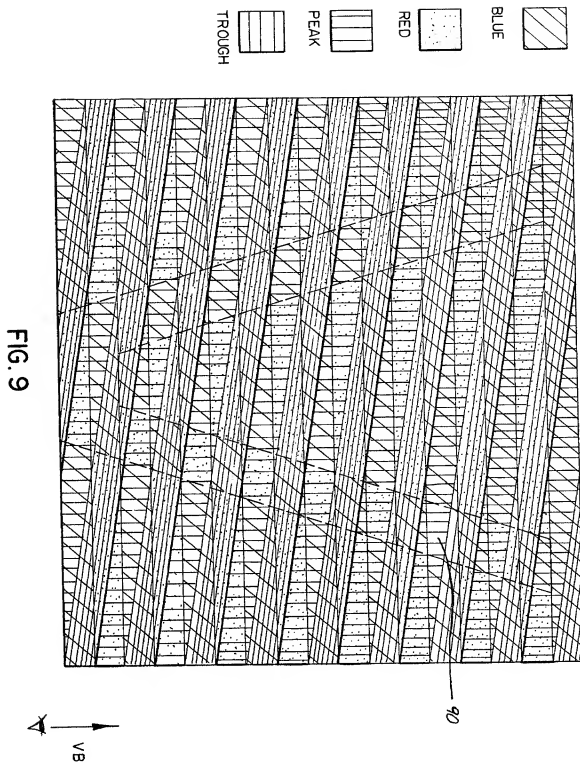


FIG. 5





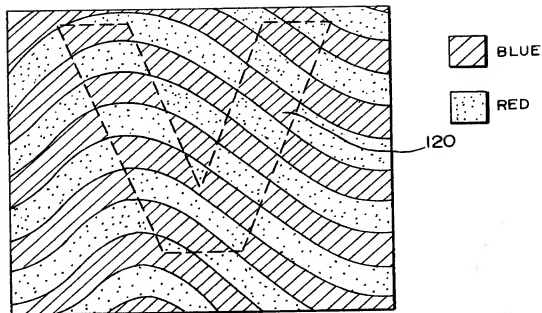


FIG. 10

**DERWENT-ACC-NO:** 1977-J6557Y

**DERWENT-WEEK:** 197743

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**TITLE:** Coloured transitory images in  
printed articles in which set of  
spaced embossed lines overlap two  
sets of lines at a specified  
angle

**PATENT-ASSIGNEE:** CANADIAN BANK NOTE CO LTD[CABAN]

**PATENT-FAMILY:**

| <b>PUB-NO</b> | <b>PUB-DATE</b>  | <b>LANGUAGE</b> |
|---------------|------------------|-----------------|
| CA 1019012 A  | October 11, 1977 | EN              |

**APPLICATION-DATA:**

| <b>PUB-NO</b> | <b>APPL-DESCRIPTOR</b> | <b>APPL-NO</b>    | <b>APPL-<br/>DATE</b> |
|---------------|------------------------|-------------------|-----------------------|
| CA 1019012A   | N/A                    | 1975CA-<br>222884 | March<br>24,<br>1975  |

**INT-CL-CURRENT:**

| <b>TYPE</b> | <b>IPC DATE</b>   |
|-------------|-------------------|
| CIPS        | B41M3/14 20060101 |

**ABSTRACTED-PUB-NO:** CA 1019012 A

**BASIC-ABSTRACT:**

A printed article comprising at least two sets of coloured equally-spaced lines of contrasting colours alternating with one another; a set of embossed lines spaced apart by the spacing of lines of either one of the sets, and overlapping the two sets of lines in at least one visually-perceptible portion of the article at an angle of 0 deg. to 10 deg.

The set of embossed lines selectively occlude a selected one of the two sets of coloured lines in the visually-perceptible portion at an acute angle of view of the surface of the article within an area defining a recognition pattern, the boundaries of which recognition pattern are defined by a phase shift of the pattern of embossed lines relative to the pattern of coloured lines. The apparent colour of the recognition pattern relative to the immediately adjacent pattern of the sets of coloured lines varies as the angle of view of the surface of the article changes from the normal to an acute angle of view.

**TITLE-TERMS:** COLOUR TRANSITORY IMAGE PRINT  
ARTICLE SET SPACE EMOSS LINE  
OVERLAP TWO SPECIFIED ANGLE

**DERWENT-CLASS:** P74